

What is claimed is:

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1. A cassette for use in a system for controlling the flow of fluid downstream from a source to a patient, the cassette comprising:
first valving means located downstream from the source, the first valving means comprising a valving chamber; and
second valving means located downstream from the first valving means in line with the valving chamber and the patient;
wherein the first valving means, while sealed closed preventing fluid communication from the source, is adapted to urge a charge of pressurized fluid downstream from the valving chamber while the second valving means restricts flow to the patient.
2. A cassette according to claim 1, the first valving means further comprising:
a compliant membrane;
the membrane capable of controlling fluid communication with the source.
3. A cassette according to claim 2, wherein the membrane defines the valving chamber such that the valving chamber is expandable and capable of accepting and retaining the charge of fluid.
4. A cassette according to claim 3, wherein the charge is pressurized solely by a force exerted by the compliant membrane.
5. A cassette according to claim 1, the cassette further comprising:
pressure-conduction means located downstream from the source and upstream from the first valving means.
6. A cassette according to claim 5, the first valving means further comprising:
a compliant membrane;
the membrane capable of controlling fluid communication between the pressure conduction means and the second valving means.
7. A cassette according to claim 6, the pressure-conduction means further comprising:
a second membrane;
the second membrane defining a pressure-conduction chamber in fluid communication with the valving chamber.
8. A cassette for use in a system for controlling the flow of intravenous fluid from a

source to a patient, the cassette comprising:

a membrane-based valve comprising:

a rigid housing, having a first mouth, a first passage, a second mouth, and a second passage; and

a compliant membrane; and

a control valve located between the membrane-based valve and the patient; the housing and the membrane coupled, defining a valving chamber, the first passage entering the valving chamber at the first mouth located such that flow of fluid via the first passage into the chamber may be prevented when the membrane is forced against the first mouth, the second passage exiting the valving chamber at the second mouth, so that a charge of pressurized fluid may be urged by the compliant membrane to continue flow from the valving chamber into the second passage via the second mouth toward and may be provided to the patient when both the membrane is forced against the first mouth and the control valve restricts fluid flow.

9. A cassette according to claim 8, further including:

a second membrane;

wherein the rigid housing and the second membrane are coupled so as to define a pressure-conduction chamber; the first passage providing fluid communication between the pressure-conduction chamber and the valving chamber.

10. A cassette according to claim 9, wherein a pressure-conduction chamber portion of the rigid housing is generally dome-shaped, the second membrane has a filled-chamber position, in which position the pressure-conduction chamber is substantially at its greatest volume, and an empty-chamber position, in which position the pressure-conduction chamber is substantially at its smallest volume, and in which position the second membrane rests against the rigid housing and assumes the dome shape of the rigid housing, the second membrane having a structure for causing relative instability of the second membrane in the filled-chamber position.

11. A cassette according to claim 10, wherein the structure for causing relative instability in the filled-chamber position may be actuated to cause relative instability in the empty-chamber position.

12. A cassette according to claim 11, wherein the pressure-conduction chamber has a first pressure-conduction chamber mouth in fluid communication with the source and a second pressure-conduction chamber mouth in fluid communication with the first passage, such that in the empty-chamber position, the rigid housing and the second
5 membrane define an unobstructed fluid passageway through the pressure-conduction chamber from the first to the second pressure-conduction chamber mouth.

13. A cassette according to claim 12, wherein the structure for causing relative instability in the filled-chamber position causes the second membrane, when in the filled-chamber position, to collapse in the region of the second mouth before collapsing nearer
10 the first mouth.

14. A cassette for use in a system for controlling the flow of intravenous fluid from a source to a patient, the cassette comprising:
a rigid housing; and
a membrane disposed adjacent the rigid housing;
15 the rigid housing and the membrane defining a pressure-conduction chamber;
wherein a pressure-conduction chamber portion of the rigid housing is generally dome-shaped, the membrane has a filled-chamber position, in which position the pressure-conduction chamber is substantially at its greatest volume, and an empty-chamber position, in which position the pressure-conduction chamber is substantially at its smallest
20 volume, and in which position the membrane rests against the rigid housing and assumes the dome shape of the pressure-conduction chamber portion of the rigid housing, the membrane having a structure for promoting a collapse of the membrane from the filled-chamber position to the empty-chamber position.

15. A cassette according to claim 14, wherein the structure may be actuated to cause
25 relative instability in the empty-chamber position.

16. A cassette according to claim 15, wherein the pressure-conduction chamber has a first pressure-conduction chamber mouth providing fluid from the intravenous-fluid source and a second pressure-conduction chamber mouth leading to the first passage, such that in the empty-chamber position, the rigid housing and the membrane define an
30 unobstructed fluid passageway through the pressure-conduction chamber from the first to the second pressure-conduction chamber mouth.

17. A cassette according to claim 16, wherein the structure causes the membrane, when in the filled-chamber position, to collapse in the region of the second mouth before collapsing nearer the first mouth.

18. A cassette according to claim 14, the membrane having an interior surface that
5 comes into contact with the fluid and an exterior surface, wherein the structure includes a tab extending from the exterior surface from a point adjacent where the rigid housing meets the membrane.

19. A cassette according to claim 14, the membrane having an interior surface that comes into contact with the fluid and an exterior surface,
10 wherein the membrane is molded in the empty-chamber position with the interior surface having a smooth concave dome shape corresponding to the dome shape of pressure-conduction chamber portion of the rigid housing and wherein the exterior surface having a generally convex dome shape, but further having some additional material to cause the membrane to be unstable in the filled-chamber position.

20. A cassette for use in a system for controlling the flow of intravenous fluid from a source to a patient, the cassette comprising:

a rigid housing; and

a membrane disposed adjacent the rigid housing;

the rigid housing and the membrane defining a pressure-conduction chamber;

20 wherein a pressure-conduction chamber portion of the rigid housing is generally dome-shaped, the membrane has a filled-chamber position, in which position the pressure-conduction chamber is substantially at its greatest volume, and an empty-chamber position, in which position the pressure-conduction chamber is substantially at its smallest volume, and in which position the membrane rests against the rigid housing and assumes
25 the dome shape of the pressure-conduction chamber portion of the rigid housing, the membrane having a structure which may be actuated to reduce resistance of the membrane to initial movement from the empty-chamber position to the filled-chamber position.

21. A cassette according to claim 20, the membrane having an interior surface that comes into contact with the fluid and an exterior surface, wherein the structure includes a
30 tab extending from the exterior surface from a point adjacent where the rigid housing meets the membrane, wherein the tab may be urged, by an actuator in a control unit for

receiving the cassette, towards the rigid housing so as to lift a portion of the membrane away from the rigid housing.

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